



GLYCOSYLATED HAEMOGLOBIN AND TYPE 2 DIABETES MELLITUS COMPLICATIONS.

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Article Received on 23/06/2019

Article Revised on 13/07/2019

Article Accepted on 03/08/2019

ABSTRACT

Back ground: Worldwide the prevalence of Type 2 Diabetes Mellitus has been rising, and more than 180 million people are affected globally. Of all the cases of diabetes mellitus, almost 90% are of type 2 diabetes mellitus (Type 2 DM) and rest being type 1 (Type 1 DM). Untreated diabetes ultimately leads to microvascular and macrovascular complications, more commonly in T2 DM. Glycosylated haemoglobin is important parameter for the checking of glycaemic status among the diabetic patients. **Objectives:** To find the demographic profile in the study population and to determine the HbA1C levels among diabetic patients and its associations with diabetes complications. **Methodology:** A cross sectional study at medical outpatient department at Krishnaveni hospital during the period from December 2018 to May 2019. A total of 97 patients interviewed with self administrated questionnaire and lab values taken from the same hospital premises. Necessary statistical tests like simple proportions and chi square tests were applied. **Results:** In the study population, majority of the patients between 51-60 years and it accounts 56.7% and 60 years and above patients were 10.3%. About 35.5% were having smoking habit, alcohol consumption was about 18.5% among males and females no alcohol consumption was reported. In the present study, approximately 55% of the patients were having HbA1 C level more than 7%. 34% of the Diabetes Patients were having Diabetic neuropathy complications. **Conclusions:** Based on the study results, more number of people having micro vascular complications like diabetic neuropathy, retinopathy and nephropathy were observed in the study. Life style factors like smoking habit was more among male diabetic patients. More than half of Diabetic patients were having HbA1C > 7%.

KEYWORDS: Age, Sex, Occupation, Smoking, HbA1C, Exercise, Complications.

INTRODUCTION

Diabetes mellitus long back considered a minor significance to the human health. Nowadays, Diabetes mellitus is the most wide spread disease of mankind. Diabetes is a syndrome characterised by chronic hyperglycaemia and disturbance of carbohydrate, fat and protein metabolism associated with absolute or relative deficiencies in insulin secretion and/or insulin action.^[1,2] Based on the duration of diabetes disease itself can produce micro vascular complications as well as macro vascular complications such as coronary heart disease, cerebrovascular diseases and peripheral vascular diseases.

Recent WHO reports show that India already has the largest number of diabetic patients in the world and about 180 million people^[9] are affected globally. The rising trend in the prevalence of type-2 diabetes has also been reported in a series of epidemiological studies.^[2,3] Of all the Diabetic population, about 90% from Type 2

Diabetes mellitus individuals.^[10] A major multicentric study was carried out on the complications of type-2 diabetes, in which India was also a participant.^[4]

This WHO study showed coronary heart disease prevalence rates in diabetics between 26% and 35% with higher rates in women and with much heterogeneity among countries. Similar study carried out in south India showed high prevalence of vascular complications in type-2 diabetes. The risk of peripheral vascular diseases (PVD) and other macro and micro vascular complications in diabetic patients was found 3-5 fold higher compared to that in non-diabetics.^[5-7]

The HbA1c reflects overall blood glucose levels over a period of 3 months and further, used to monitor diabetic therapy and also useful for the diagnosis of Diabetes Mellitus. The HbA1c does not require fasting blood sample and it is not affected by recent meals. In our previous study, we have reported that the HbA1c level is

a reliable parameter for assessing diabetes associated hyperlipidaemia, nephropathy and neuropathy.^[11,12]

In view of the above problems, present study was taken up to conduct the study to find the glycaemic status among the Diabetes patients and also to determine the microvascular complications among the diabetes patients.

OBJECTIVES

1. To find the demographic characteristics among the study patients.
2. To determine the HbA1C levels among diabetic patients and its associations with diabetes complications.

METHODOLOGY

Target population: All the diabetic patients visited to outpatient department of the hospital.

Study Design: A cross sectional study was conducted at outpatient department of Krishnaveni hospital.

Study period: from the period from December 2018 to April 2019 among type 2 diabetes patients.

Sample Size: Based on the previous studies prevalence of uncontrolled status of glycaemia among the diabetes status taken as 50%, absolute precision is 10% and at 95 % confidence interval, sample size was arrived as 97.

Sampling method: As the study duration is 6 months, hence all the diabetics fitted to my study design and interviewed with questionnaire and collected information from the individual and also from laboratory of the hospital for HbA1c value.

Exclusion Criteria: Type 1 Diabetic patients by age. Newly detected Diabetes people were excluded in the study. Gestational Diabetes or Diabetes among the pregnancy.

Inclusion criteria: All the old Diabetic patients visited at Outpatient department and their age more than 40 years.

Statistical Analysis: Data was entered in Microsoft office Excel and necessary statistical tests like simple proportions, for categorical analysis chi square test and fisher exact tests were applied. Confidentiality of the patients was maintained at all the levels.

Table 1: Socio demographic variables among the study population.

Variables	Number of the patients	Percentage
Age		
40-50 yrs	32	33
51-60 yrs	55	56.7
> 60 yrs	10	10.3
Total	97	100
Sex		
Male	45	46.4
Female	52	53.6
Total	97	100
Occupation		
Employed	70	72.2
Unemployed	27	27.8
Total	97	100
Family income		
< 5000/month	15	15.5
> 5000/month	82	84.5
Total	97	100

Table 1 revealed that in the study population, majority of the patients between 51-60 years and it accounts 56.7%, 60 years and above patients were about 10.3%. About 27.8% were unemployed people.

Table: 2- Life style factors among the study population.

Life style factors	Number	Percentage
Smoking (n-45 males)	16	35.5%
Tobacco chewing (n-52 females)	02	3.8%
Smoking duration (n-16 males)		
< 15 years	9	56.2%
> 15 yrs	7	43.8%
Alcohol consumption (n-97)		
Males (n-45 males)	18	18.5%
Females (n-52 females)	0	0%
Alcohol duration (n-18)		
< 15 years	11	61.1%
> 15 yrs	07	38.9%
Exercise (n-97)		
Yes	31	31.9%
No	66	68.1%

Table 2 depicts that in the present study, 35.5% male patients were smokers. Of which 43.8% were smoking more than 15 years of duration. Approximately 31.9% of Diabetes patients were practising exercise.

Table 3: Glycaemic control among the Diabetes Population.

Glycemic control based on Hb A1C	Number	Percentage
Hb A1C < 7%	43	44.4%
Hb A1C > 7%	54	55.6%
Total		100%

Table 3 shown that 55.6% of patients were having HbA1C more than 7%.

Table 4: Duration of exercise in relation to Glycaemic control of the study population (n-31).

Duration of Exercise	Hb A1C < 7%	Hb A1C >7%	Total
< 30 minutes	08 (36.3%)	14 (63.7%)	22 (100%)
= or > 30 minutes	07 (77.7%)	02 (22.3%)	09 (100%)
Total	15 (48.3%)	16 (51.7%)	31 (100%)

$\chi^2 - 4.39, 1df, P-0.03.$

Table 4 revealed that in the present study, those who were doing exercise more than 30 minutes, their HbA1 C level was < 7% in 77.7 percentage of individuals and those were doing less than 30 minutes of exercise, the Hb A1 C level was < 7% in 36.3 percentage of individuals. There was statistically significant association was found between exercise duration and Hb A1 C level ($P < 0.05$).

Table 5: Status of Micro vascular complications among the Diabetes study population (n-97).

Type of Complications	Number	Percentage
Diabetic neuropathy	33/97	34%
Diabetic retinopathy	29/97	29.8%
Diabetic nephropathy	28/97	28.8%

Table 5 depicts that in the present study, about 34% of diabetes patients were having diabetic neuropathy, approximately 30% were having Diabetes retinopathy complications and 29% were nephropathy complications.

Table 6: Status of microvascular complications according to HbA1C level in the study population.

Type of Complications	Hb A1C < 7%	Hb A1C >7%	Total
Diabetic neuropathy	10 (30.3%)	23 (69.7%)	33 (100%)
Diabetic retinopathy	12 (41.3%)	17 (58.7%)	29 (100%)
Diabetic nephropathy	10 (35.7%)	18 (64.3%)	28 (100%)

$\chi^2 - 4.39, 1df, P-0.03.$

Table 6 revealed that in the study population, among the diabetic neuropathy patients, about 69.7% were having HbA1C more than 7%. Where as in diabetic neuropathy patients, approximately 58.7% were having HbA1C level more than 7%.

DISCUSSION

The present cross sectional hospital based study was conducted during period from December 2018 to May 2019 at outpatient department of General Medicine. In the study population, majority of the patients between 51-60 years and it accounts 56.7%, 60 years and above patients were about 10.3%. Study conducted in Indore, India revealed that 51.3% were males and 48.7% were females. Mean age in his study was reported as for the males it was 57.8 years and for the females 60.1 years.^[13]

The selected patients were evaluated for presence of most common micro vascular complications like retinopathy, nephropathy and neuropathy by relevant investigations. Retinopathy was diagnosed by detailed fundus examination and was classified according to diabetes retinopathy study (DRS) and early treatment diabetic retinopathy study (ETDRS). Urine for micro albuminuria (30-300 mg/ 24 hrs) was tested by micral test for incipient nephropathy. Overt nephropathy was confirmed by estimation of level of blood urea, serum creatinine and macroalbuminuria. Neuropathy was diagnosed by history of numbness, paraesthesia, tingling sensation and confirmed by touch sensation with 10 gm monofilament, vibration sense by biothesiometer and ankle reflex.^[14]

In the present study observed that 34% of the Diabetes patients were having diabetes neuropathy, 29.8% were having the diabetes retinopathy and 28.8% were having the retinopathy complications. Study conducted by RP Agarwal et al in Rajasthan among 11,157 subjects in the hospital settings, revealed that micro vascular complications of diabetes retinopathy as 32.5%, diabetes neuropathy as 26.8% and diabetes nephropathy as 30.2% in his study.^[14]

Present current study stated that among all the diabetic patients, 69.7% of the patients were having more than 7% HbA1C level and labelled them as uncontrolled diabetes people. Study conducted by Murugan et al in Chattisgarh, India revealed that the good glycemic control is more potent factor and is being assessed by the measurement of glycosylated hemoglobin. This assay plays central roles in diabetic management, patients clinical guidance etc.^[15]

Some of the limitations of the study is conducted on small sample and generalising the study finding with the entire Hyderabad population is not rationale. This study will give insight about the situation among the Diabetes individuals and also useful strategy for the management of clinicians. As per the literature, some factors affecting the HbA1C levels like erythropoiesis, altered haemoglobin and glycation, haemoglobinopathies, splenectomy, rheumatoid arthritis and antiviral drugs, hyperbilirubinaemia, alcoholism and large doses of aspirin consuming the patients. These factors not included in the present study.

CONCLUSIONS

HbA1c has been categorized as the standard test in the prognosis as well as the diagnosis of diabetes, although the conventional glucose monitoring is used as an adjunct in most of the cases. For a developing country like India where an economic changes resulting changes in the lifestyle is posing increasing load of diabetic population, a regular monitoring of mean glucose is very much needed for the good management of diabetes for the treating clinician.

Source of funding: None.

Conflict of interest: None.

ACKNOWLEDGEMENTS: Special gratitude to all the study participants for successful completion of the study.

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